

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 2519a
MSDS Number: 2519a
SRM Name: Wavelength Reference
Hydrogen Cyanide Absorption
Cell

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Description: SRM 2519a is a single-mode optical-fiber-coupled absorption cell containing less than 1 mg of hydrogen cyanide ($\text{H}^{13}\text{C}^{14}\text{N}$) gas at a pressure of 3.3 kPa (25 Torr).

Substance: Hydrogen Cyanide Gas.

Other Designations: Hydrogen Cyanide (hydrocyanic acid; prussic acid; anhydrous hydrogen cyanide; formonitrile; carbon hydride nitride).

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Registry	EINECS	Concentration (%)
Hydrogen Cyanide	74-90-8	200-821-6	100

Index, R/S Phrases (EC): F+, T+, N; R12, R26, R50/53; S1/2, S7/9, S16, S36/37, S38, S45, S60, S61
See "Section 15".

3. HAZARD IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 4 Fire = 4 Reactivity = 2

Major Health Hazards: Potentially fatal if inhaled or if swallowed; respiratory tract irritation; eye irritation.

Physical Hazards: Extremely flammable liquid and vapor. Vapor may cause flash fire. May polymerize. Cell may rupture or explode. May react on contact with water.

Potential Health Effects:

Inhalation: Respiratory tract irritation, lung congestion, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, dizziness, disorientation, emotional disturbances, loss of coordination, eye damage, bluish skin color, suffocation, blood disorders, paralysis, convulsions, unconsciousness, coma, death.

Skin absorption: Bluish skin color, nausea, vomiting, chest pain, irregular heartbeat, headache, dizziness.

Eye contact: Eye damage, irritation, nausea, vomiting, irregular heartbeat, headache, dizziness, disorientation, convulsions.

Ingestion: Ingestion may cause systemic effects as described in inhalation.

Carcinogen Status:

National Toxicology Program (NTP) Report on Carcinogens
International Agency for Research on Cancer (IARC) Monographs
Occupational Safety and Health Administration (OSHA)

Yes**No**XXX

4. FIRST AID MEASURES

Skin Contact: Rinse affected area with soap and water for at least 15 minutes while removing contaminated clothing. Obtain medical assistance immediately.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance immediately.

Inhalation: Remove from exposure when safe to enter area. If not breathing, give artificial respiration by qualified personnel. Get immediate medical attention.

Ingestion: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. If vomiting occurs, keep head lower than hips to help prevent aspiration.

Note to Physician: Consider amyl nitrate inhalation, 1 ampoule (0.2 mL) every five minutes, and oxygen.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Severe fire hazard. Cell may rupture or explode in contact with heat. Gas may ignite at distant ignition sources and flash back. Keep away from sources of ignition.

Extinguishing Media: Let gas burn unless leak can be stopped immediately.

Fire Procedures: Move cell from fire area if it can be done without risk. Use extinguishing agents appropriate for surrounding fire. Keep unnecessary people away, isolate hazard area and deny entry. Avoid inhalation of combustion by-products.

Flash Point (°C): -18 (CC)

Autoignition (°C): 538

Flammability Limits in Air (Volume %): **UPPER:** 40

LOWER: 5.6

Flammability Class (OSHA): IA.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Avoid contact with cyanide gas. Keep unnecessary people out of area. Avoid heat, flames, sparks and other sources of ignition.

Environmental Precautions: See "Section 13".

Clean-up Methods: Ventilate area and closed spaces before entering.

7. HANDLING AND STORAGE

Storage: The protective caps provided for the FC/APC fiber connectors should be replaced when the SRM is not in use. This SRM is intended to be used in a laboratory environment near ambient room temperature (22 ± 5 °C). Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Protect from physical damage. Store with flammable liquids. Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances.

Precautions for Safe Handling: See "Section 8".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Hydrogen Cyanide	100	OSHA TWA (skin): 11 mg/m ³
		NIOSH STEL (Skin): 5 mg/m ³
		UK MEL STEL (Skin): 11 mg/m ³

Engineering: An eye wash station and drench shower should be readily available near the handling and use areas.

Ventilation: Local exhaust or process ventilation system.

Respirator: Under conditions of frequent use or heavy exposure, if engineering controls are not feasible, respirator protection is required; see 42CFR84 for selection and use.

Eye Protection: Wear splash resistant safety goggles with a face shield. DO NOT wear contact lenses in the laboratory.

Personal Protection: Wear chemically resistant gloves and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Hydrogen Cyanide Gas	
Appearance and Odor: colorless gas, almond odor	Vapor Density (air = 1): 0.94
Molecular Formula: HCN	pH: weakly acidic
Relative Molecular Mass: 27	Water Solubility: soluble
Vapor Pressure (@20 °C): 620 mmHg	Solvent Solubility: soluble in alcohol; slightly soluble in ether

10. STABILITY AND REACTIVITY

Stability: Stable X Unstable

May react with the evolution of heat on contact with water.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Avoid any contact or inhalation of hydrogen cyanide gas. Keep separate from incompatible materials.

Incompatibility (Materials to Avoid): Oxidizing materials, combustible materials, bases, amines, acids.

Hazardous Decomposition or Byproducts: Thermal decomposition produces cyanides. Contact with strong oxidizers presents a fire and explosion hazard.

Hazardous Polymerization: X Will Occur Will Not Occur

Hydrogen cyanide polymerizes with evolution of heat. Avoid contact with air, light, water, incompatible material or storage and use above room temperature.

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation: X Skin X Ingestion

Hydrogen Cyanide Toxicity Data	
LD _{LO} (Oral, Human)	570 µg/kg
LC _{LO} (Inhalation, Human)	120 mg/m ³ /1 h
TC _{LO} (Inhalation, Human)	5 mg/m ³

Health Hazards (Acute)

Inhalation: Death has been reported in a human from exposure to 500 mg/m³ for 3 minutes. Low levels may result in irritation of the nose and throat, a bitter almond odor on the breath, a burning taste, feeling of constriction of the throat, blotchy skin eruptions of the face, salivation, nausea with or without vomiting, anxiety, confusion, vertigo, giddiness, weakness, headache, rapid pulse, palpitations, ataxia, lower jaw stiffness, lactic acidosis, and opisthotonos. Respiratory rate and depth usually increase initially, becoming slow and gasping. May cause irritation of the mucous membranes.

Ingestion: Ingestion of liquefied gas may cause systemic effects described in acute inhalation.

Skin Contact: May be rapidly absorbed through the skin with little or no irritating effects. If sufficient amounts are absorbed, systemic effects may occur as in acute inhalation.

Eye Contact: May cause irritation with redness and pain, and superficial keratitis. Some absorption may be hazardous causing systemic effects described in acute inhalation. Application of 1040 µg/kg to the eyes of rabbits was lethal.

Medical Conditions Generally Aggravated by Exposure: Blood system disorders, heart or cardiovascular disorders, nervous system disorders.

12. ECOLOGICAL INFORMATION

Fish Toxicity: 5 µg/L/12 weeks.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with federal, state and local regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): P063.

14. TRANSPORTATION INFORMATION

DOT and IATA Registry: Not regulated.

15. REGULATORY INFORMATION

U.S. REGULATIONS

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE:	Yes
CHRONIC:	No
FIRE:	Yes
REACTIVE:	Yes
SUDDEN RELEASE:	Yes

TSCA(12b): Listed on inventory.

STATE REGULATIONS

California Proposition 65: Not regulated.

CANADIAN REGULATIONS

WHMIS Classification: Not determined.

EU CLASSIFICATION

F+	Extremely Flammable
T+	Very Toxic
N	Dangerous to the environment

EU RISK AND SAFETY PHRASES

R12	Extremely flammable.
R26	Very toxic by inhalation.
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S1/2	Keep locked-up and out of reach of children.
S7/9	Keep container tightly closed and in a well-ventilated place.
S16	Keep away from sources of ignition - No smoking.
S36/37	Wear suitable protective clothing and gloves.
S38	In case of insufficient ventilation, wear suitable respiratory equipment.
S45	In case of accident or if you feel unwell, seek medical advice immediately. (Show the label where possible).
S60	This material and/or its container must be disposed of as hazardous waste.
S61	Avoid release to the environment. Refer to special instructions/Safety data sheets.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc., MSDS *Hydrogen Cyanide*, 16 September 2004.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.